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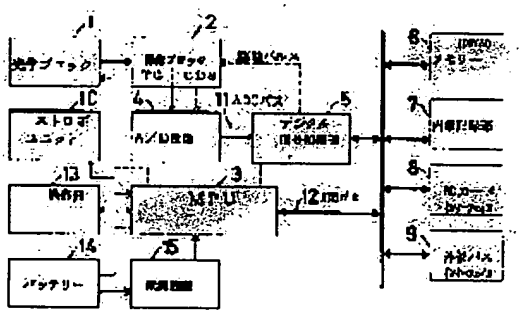
(54) CAMERA

(57)Abstract:

PROBLEM TO BE SOLVED: To allow the camera to flexibly cope with various image pickup operations for digital signal processing.

SOLUTION: A copy image is formed to a charge coupled device(CCD) of an image pickup block 2 through an optical block 1 and converted into an image signal. Then the analog image signal from the CCD is converted into a digital signal by an A/D converter 4 and prescribed signal processing is conducted by a digital signal processing section 5. Furthermore, required prescribed information is obtained by preparation of image pickup under the control of an MPU 3 through the processing of the digital signal processing section 5 and main image pickup is conducted according to the information.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the camera which performs digital signal processing.
[0002]
[Description of the Prior Art] Drawing 6 is the block diagram showing the composition of the conventional digital camera. In this drawing, it is CCD whose 52 51 is the optical block of a lens, a shutter, etc. and is a solid state image pickup device, and the common sensor for movie methods is used.
[0003] CPU to which 53 controls each block and the whole system, the A/D converter from which 54 changes the image pck-up output of CCD52 into a digital signal, the digital-signal-processing section which carries out digital processing of the video signal into which 55 was inputted through the ADC bus 59 from A/D converter 54, and 56 are the Records Department which records in digital one the image data inputted through the ADD bus 60 from CCD52 on a record medium.
[0004] The D/A converter from which 57 changes the digital signal from the digital-signal-processing section 55 into an analog signal, and 58 are the video outlet sections for outputting the output of D/A converter 57 to external TV monitor etc.
[0005] In the camera of the above-mentioned composition, the video signal outputted from CCD52 through the optical block 51 is changed into a digital signal by A/D converter 54, the digital-signal-processing section 55 performs gamma processing and other signal amendments, and digital data is recorded on the Records Department 56. Moreover, after changing the data of the Records Department 56 into an analog signal by D/A converter 57 through the digital-signal-processing section 55, it changes into TV signal in the video outlet section 58, and an image is copied out by external TV monitor etc.
[0006]
[Problem(s) to be Solved by the Invention] However, if it was in the above conventional cameras, there was a trouble that it may be unable to correspond to various photography operation.
[0007] For example, since it was not the composition that low dc-battery detection at the time of photography was performed using two or more meanses, it has not responded flexibly to various photography operation.
[0008] Moreover, since AF, AE, and AWB (automatic white balance) were using the picture field of the same full screen, the optimal exposure by AF was not able to be obtained. Furthermore, since it had measured separately by AF-AE-AWB, respectively while there were quite a few problems in respect of precision also by AE or AWB, processing had taken time.
[0009] this invention was made paying attention to the above troubles, and aims at offering the camera in which flexible correspondence is possible to various photography operation.
[0010]
[Means for Solving the Problem] The camera concerning this invention is constituted as follows.
[0011] (1) It has an image pck-up means to change the photoed photographic subject image into an electric picture signal, the A/D converter which changes the analog picture signal from this image pck-up means into a digital signal, and a signal-processing means to perform predetermined signal processing to the digital signal, and the predetermined information for photography was acquired by processing of the aforementioned signal-

processing means.
[0012] (2) In the camera of the above (1), the photometry information for focuses and the photometry information for exposure regulation were acquired from the field where image pck-up meanses differ, respectively as predetermined information for photography.
[0013] (3) In the above (1) or the camera of (2), the colorimetry information on a picture was acquired from two or more picture fields of an image pck-up means as predetermined information for photography.
[0014] (4) The picture field which has effective data was chosen from two or more colorimetry data in the camera of the above (3).
[0015] (5) In the camera of the above (1), the photometry information for exposure regulation and the colorimetry information on a picture were simultaneously acquired as predetermined information for photography.
[0016] (6) The above (1) or (5) In which camera, after acquiring the predetermined information for photography, this photography is performed and the digital image signal from a signal-processing means was stored in the storage means.
[0017] (7) After acquiring the predetermined information for photography, it was made to repeat only this photography in the camera of the above (6).
[0018] (8) Cancellation operation of a user is received and it was made not to receive cancellation operation during this photography in the camera of the above (7) during execution of operation which acquires the predetermined information for photography.
[0019] (9) The above (1) or (8) When the voltage of a built-in power supply fell from a predetermined value during execution of operation which acquires the predetermined information for photography, it was made to interrupt this operation in which camera.
[0020] (10) The above (1) or (8) In which camera, while interrupting the processing under execution when it falls from a threshold with the voltage of a built-in power supply, when it fell from a threshold with this voltage still lower than it, the electric power switch was turned off.
[0021]
[Embodiments of the Invention] Drawing 1 is the block diagram showing the system configuration of the camera concerning this invention, and shows the system configuration of a digital camera here.
[0022] In this drawing, the optical block whose 1 has a lens, a shutter, etc., and 2 are the image pck-up blocks including circuits, such as CCD (solid state image pickup device), TG (timing generator), CDS (Correlation Double Sampling), etc. which change the photoed photographic subject image into an electric picture signal, and CCD used here has prepared the light sensing portion near a square pixel in consideration of the image processing in a computer.
[0023] 3 is MPU (microprocessor unit) which is the control means which control each block and the whole system, and it is possible for the bus to be connected from this MPU3, to transmit image data from the memory on this bus, and to perform data processing of image data in the arithmetic circuit of the MPU3 interior.
[0024] It is the A/D converter (converter) from which 4 changes the image pck-up output of CCD into a digital signal, the digital-signal-processing section to which 5 performs predetermined signal processing to the video signal from an A/D converter, and the memory (storage means) which consists of a DRAM 6 remembers the image data from CCD to be temporarily, and which can be written, and it is possible to write or read various data needed by these systems, such as a work area, besides image data. and -- while transmitting image data on this memory 6 at the time of the photography mode of a camera and sending [after that] in the digital-signal-processing section 5 and receiving data between the digital-signal-processing section 5 and memory 6 through the ADD bus 12 -- others, such as WB (white balance), AE amendment, gamma processing, and picture compression, -- various image processings are performed
[0025] 7 is the built-in Records Department which records a digital signal on a built-in record medium, and uses non-volatilized memory, such as a flash memory. 8 is a PC card interface for writing the PC card of PCMCIA conformity, and is PC card TypeIII. Record media, such as a hard disk (HDD) and flash plate memory card, can be connected now. 9 is an external bus interface (I/F) for transmitting and receiving data with an external extended unit, and is mainly used for connection with a personal computer.
[0026] 10 is a stroboscope unit for the speed light photography of this camera, and control of a start/halt of

luminescence, the charge to a main capacitor, etc. is performed in this stroboscope unit 10 by the control signal from MPU3. Furthermore, full charge is detected by reading the voltage level (charge voltage) of the main capacitor of this stroboscope unit 10 using the A/D converter inside MPU3.
[0027] 11 is an ADC bus (10-bit bus line) for carrying out data transfer to the digital-signal-processing section 5 from A/D converter 4, and the above-mentioned ADD bus 12 is a bus (16-bit bus line) for carrying out data transmission and reception mutually between MPU3, the digital-signal-processing section 5, memory 6, the built-in Records Department 7, the PC card interface 8, and an external interface 9.
[0028] 13 is the release switch of this camera, and a user interface-related control unit which displays in addition to this by a various circuit changing switch of operation and various LCD, Light Emitting Diode, etc., is equipped with 1 chip microcomputer here, and operates user interface relation by information interchange by MPU3 and serial communication.
[0029] 14 is a dc-battery (built-in power supply), and has alkali manganese single 3 cells, a nickel cadmium cell or an AC adapter, etc. as a dc-battery classification. Detection of this dc-battery level is constituted so that the voltage level of this dc-battery 14 may be read using the A/D converter inside MPU3, and it is detecting the low dc-battery etc. 15 is the power circuit.
[0030] Drawing 2 is drawing showing the circuitry inside the above-mentioned digital-signal-processing circuit 5. The ADC bus (10-bit bus line) which shows 11 to drawing 1 , and 12 are ADD buses (16-bit bus line) among this drawing.
[0031] Moreover, among drawing 2 , 20 have the data-conversion circuit which is the interface section of the ADC bus 11, the ADD bus 12, and an internal digital disposal circuit, for example, changes the 10-bit width-of-face data of an ADC bus into the data of the 16-bit width of face of an ADD bus (10/16 conversion), or transforms them inversely (16/10 conversion), and can also change data flow by the control from MPU3.
[0032] 21 is the signal processor section which carries out generation processing of the raw data from inputted CCD at the video signal of brightness and the color difference, and can obtain now various information data, such as the photometry value and colorimetry value which are acquired in process of [other than the output of a video signal] a process, and a high frequency component of an image, if needed.
[0033] The compression circuit which consists of an IC for 22 carrying out JPEG compression of the video signal from the signal processor section 21, and 23 are the JPEG buses for carrying out the data exchange between the data-interface section 20 and the compression circuit 22.
[0034] Next, photography operation of the camera of the above-mentioned composition is explained.
[0035] If the release switch on a control unit 13 is first pushed when a user photos a photographic subject, the microcomputer of a control unit 13 will detect that the release switch was pushed, will control a power circuit 15, and will turn on each part of the digital-signal-processing section 5 of drawing 1 , memory 6, the built-in Records Department 7, the PC card interface 8, the external bus interface 9, and the stroboscope unit 10. And if a power supply is supplied to MPU3, program data will be loaded from the internal program ROM, and initialization processing will be performed.
[0036] In the above-mentioned initialization processing, above-mentioned each part is set as a preparatory state of operation, or it is made to perform necessary minimum operation. For example, it communicates with the microcomputer of a control unit 13, and the state where the user operated it is investigated or a default liquid crystal display is performed. In addition to this, if the PC card is inserted, the residue of the PC card will be calculated or a required directory will be created. Moreover, if abnormalities are detected by the PC card, the error message of the abnormality will be carried out on LCD.
[0037] As a result of communicating with the microcomputer of the above-mentioned control unit 13, when it is detected that the release switch was pushed, processing of a photography sequence is performed. Drawing of the main flow of this photography sequence is shown in drawing 3 . In addition, a release switch is a switch for beginning photography operation of a camera, and consists of switch composition of the double structure of SW1 and SW2 where strokes differ.
[0038] In the flow of drawing 3 , if SW1 is pushed first, the load test of Step 100 will be performed, and a safety low dc-battery (Safety LB) check is performed after that. Moreover, the SafetyLB check of the fixed period of Step 101 is simultaneously performed by another task. One of Safet(ies) of this step 100 or Step 101 When LB is detected with LB check, a photography sequence is ended immediately and LB display is taken out

to a liquid crystal panel. The power supply of a system is not dropped at this time. And it is made not to receive almost all camera operation after that. Moreover, as operation received at this time, they are a changing battery, PC card exchange, barrier (role of main switch of camera operation)-off, etc.
[0039] Safety of the above-mentioned step 101 It is Safety by LB check. It is Safety at a fixed period until the oak which is not LB, and SW1 are released or SW2 is pushed. Carrying out LB check is continued. This fixed period is about 200 mses. And when SW1 is released or SW2 is pushed, (Step 102) and another task are ended (Step 103). This another task shows another program which is moving almost simultaneously with the main flow of a photography sequence by task switching of OS.
[0040] Safety after the load test of the above-mentioned step 100 With LB check, the load of the power circuit 15 of drawing 1 is temporarily made heavy, and it is Safety. LB check is performed. As a temporary load at this time, the power supply load of the optical block 1 of drawing 1 or the image pck-up block 2 is expected.
[0041] Safety of the above-mentioned step 100 It is Safety by LB check. When LB is detected, an image pck-up sequence is ended without putting a power supply into the above-mentioned optical block 1 and the above-mentioned image pck-up block 2, and LB is displayed. It is Safety at Step 100. A power supply is supplied to each blocks 1 and 2 of the oak which is not LB, the optics of Step 110, and an image pck-up, and photography operation preparation is set up. Processing of this step 110 is explained in detail later using drawing 4 .
[0042] After finishing processing of the above-mentioned step 110, the digital-signal-processing section 5 will be in movie operating state from the optical block 1 of drawing 1 , and preparation of the control of AF (Auto Focus) and AE (Auto Exposures), and AWB (Auto White Balance) mentioned later completes it. And AF of the TTL method only using the CCD sensor is performed by AF control of Step 120.
[0043] In the system of this AF, by making into a ranging field the field which has near a center out of all the pixels of CCD, it was specified as the signal processor 21 of drawing 2 , the integration value of the image data of the field was used as the data for AE, and the high frequency component has been obtained as data for AF. And in advance of AF, simple AE is performed first, and AF is doubled in the state of proper exposure.
[0044] In the above-mentioned simple AE, about a pixel field equivalent to the pixel field to range, I hear that what should be thought as important here doubles exposure proper for AF, and there is. That is, even if there is a photographic subject of a luminosity which deviated in the upper part, the lower part, etc. of all pixel fields, it is disregarded, exposure is doubled, and AF is performed with a sufficient precision. Thereby, proper ranging of the target pixel field can be performed.
[0045] And when AF control of Step 120 is completed, green Light Emitting Diode as the completion mark is made to turn on. Then, AE of Step 130 and AWB control are performed. This AE system and the AWB system are operating almost simultaneous by the above-mentioned another task.
[0046] In AE system, in order to measure the strength of the light in the image data of a first different large field from the pixel field used by above-mentioned ranging, specification of a field is anew done again to the signal processor 21 of drawing 2 . That is, a photometry window is changed. The field at this time is widely set up so that it may cross to a full screen mostly.
[0047] Moreover, in this AE system, while TV value amends area velocity based on the photometry data, without changing, exposure is doubled so that it may become a proper exposure value. That is, shutter speed is fixed, and it is controlled by AE of Step 130 to become proper exposure within the limits, changing drawing.
[0048] On the other hand, in the AWB system, the colorimetry is performed about two or more parts in about 1/16 comparatively small field of a full screen. For example, a colorimetry is performed about four a total of eight four vertical and horizontal corners and near a center. And range limitation of the colorimetry data of each block is carried out, and it is made not to refer to a certain data out of range.
[0049] Thereby, the portion of a photographic subject with a deep color and a portion not to carry out the colorimetry of the color in brightness over as AWB(s), such as a portion which is not right, can be removed. And statistics of the data in within the limits are taken, and a photographic subject's white balance is doubled more with accuracy. Furthermore, this AWB system computes the amendment data of a white balance by repeating reading of the colorimetry data of a 8 above-mentioned blocks field 5 times.
[0050] Next, when a user is continuing pushing only SW1 of a release switch as the conditional judgment of Step 140 shows, AE and AWB continue operating. It can follow, when the proof of the case where framing of a camera is changed, or a photographic subject changes by this, pushing SW1. By the conditional judgment of

this step 140, when SW1 is released, or when a certain cancellation occurs in addition to this, it progresses to the end of Step 141 and photography operation is stopped.
[0051] And when SW2 is pushed, image pck-up book exposure of Step 150 is performed. Although photography book exposure of this step 150 is explained in detail later using drawing 5 , if it explains simple, CCD will be changed to exposure mode, a shutter will be cut, and the image data for one screen will be transmitted to memory 6 at a stretch with a CCD transfer.
[0052] Then, although signal processing of the LB detection is forbidden and carried out at Step 160, the picture raw data on the memory is read every several lines here, and digital image processing is carried out to the image data of JPEG compression in the digital-signal-processing section 5.
[0053] Safety which described it as LB detection here previously LB checks differ and are Safety. If supply voltage lower than LB check is detected and LB is detected, the power supply of a system will be dropped immediately. This is a task (program) which is always operating from from, when a power supply is supplied to a system regardless of an image pck-up sequence.
[0054] Therefore, the purpose which forbids detection of LB at this time is for not making it interrupted by the imperfect file state of the on the way (for example, in the middle of writing the JPEG file in the PC card etc.) of signal processing for LB. And if signal processing is completed, LB detection will be started again. Moreover, during the above-mentioned signal processing, the character of BUSY is displayed on a liquid crystal panel.
[0055] Then, while performing residue calculation of Step 170, and the next number display, it is Safety of Step 161 at another task. LB check is performed. Since these steps 161-163 are performing processing equivalent to Steps 101-103 described previously, respectively, explanation is omitted.
[0056] In residue calculation of Step 170, the remaining capacity after writing a file in the medium of the built-in Records Department 7 or a PC card is calculated. With a liquid crystal panel, it changes from the BUSY mark under signal processing to the following file number then.
[0057] Next, it detects whether SW1 was released by the conditional judgment of Step 180. If released, after treatment of this manipulation routine is carried out, optics and the power supply of the image pck-up blocks 1 and 2 will be dropped, and a percent indication of a residue will be given to a liquid crystal panel (Step 191). And photography processing is ended at Step 192. At this time, without dropping immediately, the power supply of this system is dropped, after waiting during a fixed period. This is because it reacts quickly and operation can be started, when switches are pushed again next.
[0058] By the conditional judgment of the above-mentioned step 180, if SW1 is not released, it will progress to the conditional judgment of Step 190. at Step 190, SW2 is released and it pushes again -- having (repushed) -- it has detected This is for returning processing to Step 180, when only the case where SW2 continues being pushed in the front state, and SW2 are released.
[0059] That is, the loop of Steps 180 and 190 is carried out, and SW1 is released after all, or SW2 waits to be repushed again. And when repushed in SW2, photography book exposure of Step 150 is performed again. Moreover, when SW2 is pushed and curing continues, processing of Steps 150-190 is repeated.
[0060] Next, the internal flow of photography operation preparation is explained in detail to be powering on of an image pck-up and optical block of the above-mentioned step 110 using drawing 4 . In the flow of drawing 4 , initial setting of the data-interface section 20 of drawing 2 is performed at Step 201. It precedes specifically turning on the optical block 1 and the image pck-up block 2, and set the state of each driving pulse signal as Low level, the signal for driving pulses inside the data-interface section 20 is set as a predetermined state, or the flow of image data is set up beforehand.
[0061] Then, the power supply of optics and the image pck-up blocks 1 and 2 is switched on at Step 202. And a pulse setup for an image pck-up is performed at Step 203, and pixel size for making it drive by a setup and the false television signal synchronization for carrying out field read-out of CCD is set up. Although signal processing of the high-definition picture is carried out using a 570,000-pixel sensor, in order to perform AF and AE-AWB of a TTL method, in the photography preparation stage of SW1, it is necessary to carry out a movie drive by this system.
[0062] For this reason, necessary minimum pixel data are read at the time of ON of SW1, without reading the data of all pixels. Therefore, pixel size for making it drive by false television signal synchronization [for the reason] is set up, and CCD is driven.

[0063] If a pulse setup of the above-mentioned step 203 is completed, next, initial setting of drawing and an electronic shutter will be performed at Step 204. Here, a middle drawing state is set up as initial drawing, and an electronic shutter is also set as the middle active position of the mechanism shutter at the time of this exposure. For example, with Av value, drawing is set as 4 with Tv value, and an electronic shutter is set as 7.
[0064] Next, a main clock is changed at Step 205 and the basic clock of all systems is changed from the clock currently oscillated in the circuit of the data-interface section 20 interior to the clock currently oscillated with an image pck-up block. This protects a weak image pck-up circuit from noises of a clock, such as distortion, in a noise, and it is for obtaining high definition and it is made to synchronize all systems with the driving pulse centering on an image pck-up circuit.
[0065] Next, movie operation is set up at Step 206, and not only the drive of the image pck-up block 2 but a setup of A/D converter 4, the data-interface section 20, and signal PUROSSESSA 21 is set up so that it may correspond to movie operation. Specifically, the CCD output signal of the movie from the image pck-up block 2 is changed into a digital signal by A/D converter 4, and the digital signal is inputted into the direct signal processor 21.
[0066] In the signal processor 21, the inputted digital signal is processed on real time, and required data are computed by AF, AE-AWB, etc. This computed data lets the data-interface section 20 and the ADD bus 12 pass by serial communication, and is sent to MPU3. In other words, when MPU3 is required, it reads. Therefore, the setting preparations for it are made at Step 206.
[0067] Next, at Step 207, an environmental setup of the MPU3 interior for each system of AF-AE-AWB operating within MPU3 is performed. For example, an environmental setup for securing a field with DRAM of memory 6 in a work area, or each system of AF and AE-AWB carrying out an image-processing field setup to the signal processor 21, or holding the image-processing data from the signal processor 21 on memory 6 is performed.
[0068] Finally the DMA preparations at the time of this exposure are made at Step 208, and the image data shunting area of DRAM of the sake in the case of carrying out the DMA transfer of the image data of all the pixels of CCD on DRAM of memory 6 at the time of this exposure is secured. This image data shunting area has the list structure in every line, and when carrying out post-signal processing, it has a data structure which can access read-out and elimination per line.
[0069] Next, the internal flow of photography book exposure of Step 150 of drawing 3 is explained in detail using drawing 5 .
[0070] When SW2 is pushed at Step 140 of drawing 3 , the photography book exposure routine of this step 150 is performed, and it sets to the flow of drawing 5 first, and it is Safety after a load test at Step 211. LB check is performed. The load test which expected the load of the circuits (signal PUROSSESSA, JPEG compression circuit, etc.) where the load test at this time is used by the load and signal processing of a medium drive of a PC card unlike the load test of Step 100 of drawing 3 of operation is performed.
[0071] And immediately after [the / Safety] LB check is performed and it is Safety as a result of a load. If it is LB, subsequent processing is not performed, but processing is ended immediately, and LB is displayed on a liquid crystal panel. A residue check is performed at the oak step 212 which is not LB, and the residue of a record medium (or built-in Records Department or PC card) is checked.
[0072] Here, it investigates whether according to the present photography state, calculation prediction is carried out and one or more file sizes made from signal processing can be photoed. At the time of one or less sheet, 0Shot is displayed on a liquid crystal panel, photography processing is ended, and while the release switch is pushed, red Light Emitting Diode is blinked by 8Hz as an error mark. The abnormalities of switches are detected at the oak and Step 213 which are not 0Shot, and the contents of an error are displayed on a liquid crystal panel with 8Hz blink of red Light Emitting Diode at the time of abnormalities.
[0073] In this system, color picture record and high resolution monochrome record are enabled, abnormalities occurred in the circuit changing switch, and the abnormalities of the above-mentioned switches have detected it, when it is an intermediate state. A cancellation check is performed at the oak and Step 214 which do not have the abnormalities of switches at Step 213. This cancellation check confirms whether user operation who interrupts photography operation was made.
[0074] If user operation who interrupts photography operation is described concretely, the case where could

open change of barrier closing or a dial or the lid of a PC card mouth, and the mode circuit changing switch of **, color picture record, and high resolution monochrome record is changed etc. will be raised. If such cancellation operation is performed, photography processing will be ended immediately.
[0075] If cancellation is not performed, next, the check of Self-timer SW will be performed at Step 215. When a self-timer state is detected by the self-timer SW check in this step 215, self-timer operation is performed at the following step 216. This self-timer operation blinks the infrared radiation Light Emitting Diode for AF amendment of the front face of a camera during a fixed period, tells the user by the side of a photographic subject about being in a self-timer state, changes this Light Emitting Diode from 2Hz blink to 8Hz blink 2 seconds before this exposure further, and tells a user about being photography nearness.
[0076] When it is not in a self-timer state after operation of the self-timer of Step 216, or with the self-timer SW check of Step 215, the start O.K. signal of SW2 of operation is performed at Step 217. This stands the flag which started operation of SW2, and it prevents from canceling it until signal processing is completed after this. And it rechecks whether cancellation had occurred before [Step 217] by performing a cancellation check at Step 218. Thereby, cancellation can take and ****** can be lost.
[0077] Next, reconfiguration operation at the time of photography is repeatedly performed at Step 219. This is for making the preparations for photography, when taking a photograph repeatedly after processing of Step 190 of drawing 3 described previously. A setup which specifically reuses the data of operation of Step 216 shown in drawing 4 - Step 218 and last AF-AE-AWB is performed.
[0078] Therefore, nothing is performed in photography by the operation of SW2 after the first SW1 operation. Next, the stroboscope charge after SW2 operation performs perfect stroboscope charge before photography at Step 220. With this, a charge-related Light Emitting Diode mark and the Light Emitting Diode mark of low brightness warning are erased.
[0079] And it is Safety at Step 221. LB check is performed and it checks whether it is LB by consumption of the dc-battery by stroboscope charge. Then, AE in front of this exposure is performed at Step 222. This is preparation for taking a photograph by AE at the time of SW1:ON extracting, and performing exposure measurement from the state again to having been simple exposure control by control, and controlling shutter speed finely to become proper exposure finally. Thereby, final shutter speed is determined.
[0080] When a photographic subject is judged to be low brightness darkly at this time, or in being stroboscope forcible luminescence mode, EF system operates at Step 223 and it detects the existence of speed light photography. And pulley luminescence of a stroboscope is performed at Step 224, and a photometry of the exposure level at the time of this pulley luminescence is performed. And the stroboscope luminescence time at the time of this exposure is computed from the data result.
[0081] Then, stroboscope luminescence time is set up at Step 225 at the time of a setup of the shutter speed of this exposure, timing is measured at Step 226, and stroboscope luminescence, mechanism shutter control, and exposure control of CCD are performed. However, at the time of detection of the speed light photography of Step 223, a photographic subject is bright, or if it is a setup of stroboscope-off, operation of Step 224 will not be performed and, as for luminescence of a stroboscope, it will not be further carried out at the time of this exposure of Step 225, either.
[0082] And at the time of the next CCD data read-out, DMA of the image data for all pixels is performed from A/D converter 4 to DRAM of memory 6 through the data-interface section 20. Finally, if DMA is completed at Step 227, the flag of a signal will be stood, and signal processing of Step 160 of drawing 3 is performed.
[0083] Thus, the image pck-up block 2 which can read arbitrary picture fields from CCD in this example, The driving pulse generating circuit and A/D converter 4 which changes the read image data into a digital signal, The digital-signal-processing section 5 with the signal processor 21 which can compute information from a digital image signal to required AF-AE-AWB, Processing of AF-AE-AWB at the time of SW1 operation of a release switch is improvable by having the memory 6 which can shunt data temporarily, and MPU3 which can control each of those circuits freely.
[0084] Moreover, by establishing a low dc-battery detection means to check the circuit for power supply load tests and two or more supply voltage level of each part in addition to the above-mentioned composition, photography discontinuation processing at the time of various low dc-batteries in photography operation can be performed, and flexible correspondence is possible to various photography operation.

[0085]
[Effect of the Invention] As explained above, according to this invention, it is effective in flexible correspondence being attained to various photography operation.
[0086] That is, when the dc-battery has weakened remarkably, and dropping the power supply of a system in an instant, making it not apply a useless load to a dc-battery and having troubled with it a little, the power supply of a system can terminate operation of a system safely according to the state of a dc-battery by establishing two or more dc-battery check meanses as only photography operation is interrupted without dropping and warning is generated.
[0087] Moreover, without putting a power supply into the block of optics or an image pck-up, when the dc-battery has weakened by performing a load test and performing a dc-battery check, before putting a power supply into the optics immediately after SW1:ON, or an image pck-up block, as a useless load is not applied to a dc-battery, image pck-up operation can be terminated.
[0088] Furthermore, the power consumption under signal processing is lowered, a dc-battery weakens rapidly during signal processing, if it is a low dc-battery, by being made not to detect a low dc-battery, and forbidding charge of a stroboscope during signal processing, there is nothing during signal processing and it is made, at the same time it performs a load test and performs a dc-battery check just before signal processing after SW2:ON. A perfect image file can be created without a system and interrupting signal processing for an imperfect state by this. [during signal processing]
[0089] Moreover, at the time of AF of SW1:ON, AE is beforehand performed in the picture field for AF, and AF is performed in the state of the optimal exposure for AF. and after AF end -- the picture field where all fields are almost large -- AE -- carrying out -- proper exposure -- this exposure photography -- carrying out -- making -- **** -- the evaluation picture field of this AE -- a case -- dividing -- carrying out -- changing -- things -- a high definition exposure [improvement in the precision of AF and proper exposure] picture -- it can obtain .
[0090] Moreover, by carrying out the colorimetry of two or more places of a screen in a comparatively small picture field at the time of AWB of SW1:ON, the effective field as a photographic subject's white balance data is obtained alternatively, and a white balance with a good precision can be performed.
[0091] Moreover, by performing AE and AWB after the above-mentioned AF simultaneously, photography operation becomes early and can improve the release time lag in photography.
[0092] Furthermore, it enables it to perform the next photography (this exposure and signal processing) immediately, not redoing AF-AE-AWB but holding the state of last AF-AE-AWB, when only SW2 was released and SW2 was turned on again, after taking a photograph by SW2:ON after SW1:ON (after signal processing). When taking a photograph repeatedly, while being able to shorten photography time by this, different framing and different photographic subject photography can be performed on photography conditions, such as the same AF-AE-AWB. This is effective when creating a panorama picture later.
[0093] Moreover, in the photography preparation stage (AF-AE-AWB is included) of SW1, without CCD carrying out all pixel read-out, by reading the image data of some fields in the state of a movie, each operation at SW 1:00, such as AF-AE-AWB, can be sped up, and release time lag can be improved.
[0094] Moreover, the user cancellation by camera operation is received and the user is preventing from canceling during signal processing of SW2:ON in the state of only SW1:ON. Thereby, a perfect image file can be created, without interrupting signal processing for an imperfect state. Furthermore, as it investigates whether user cancellation was certainly generated just before signal processing, user cancellation takes and it spills, and there can be no **.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

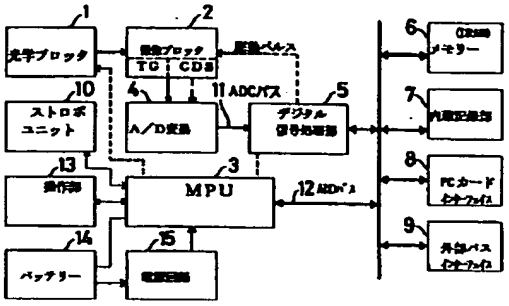
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram showing the system configuration of the camera concerning this invention
[Drawing 2] The block diagram showing the internal configuration of the digital-signal-processing section of drawing 1
[Drawing 3] Drawing showing the main flow of the image pck-up sequence of an example
[Drawing 4] Drawing showing the detailed flow of an image pck-up and optical powering on of drawing 3 , and photography operation preparation
[Drawing 5] Drawing showing the detailed flow of photography book exposure of drawing 3
[Drawing 6] The block diagram showing the conventional digital camera structure of a system
[Description of Notations]
1 Optical Block
2 Image Pck-up Block
3 MPU (Control Means)
4 A/D Converter (Converter)
5 Digital-Signal-Processing Section
6 Memory (Storage Means)
7 Built-in Records Department
10 Stroboscope Unit
13 Control Unit
14 Dc-battery (Built-in Power Supply)
15 Power Circuit

[Translation done.]

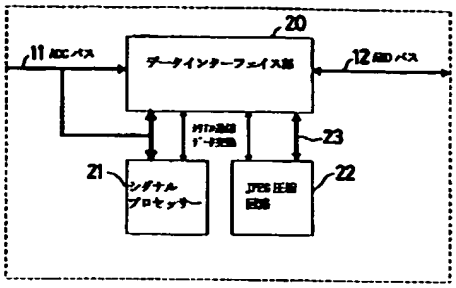
【図1】

本発明に係るカメラのシステム構成



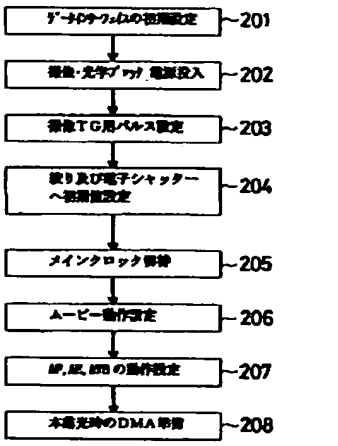
【図2】

デジタル信号処理部の内部構成



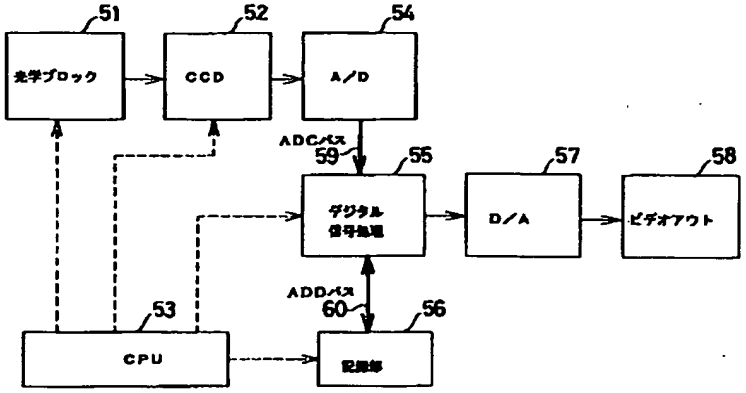
【図4】

撮像・光学 電源投入及び撮影動作準備の内部フロー



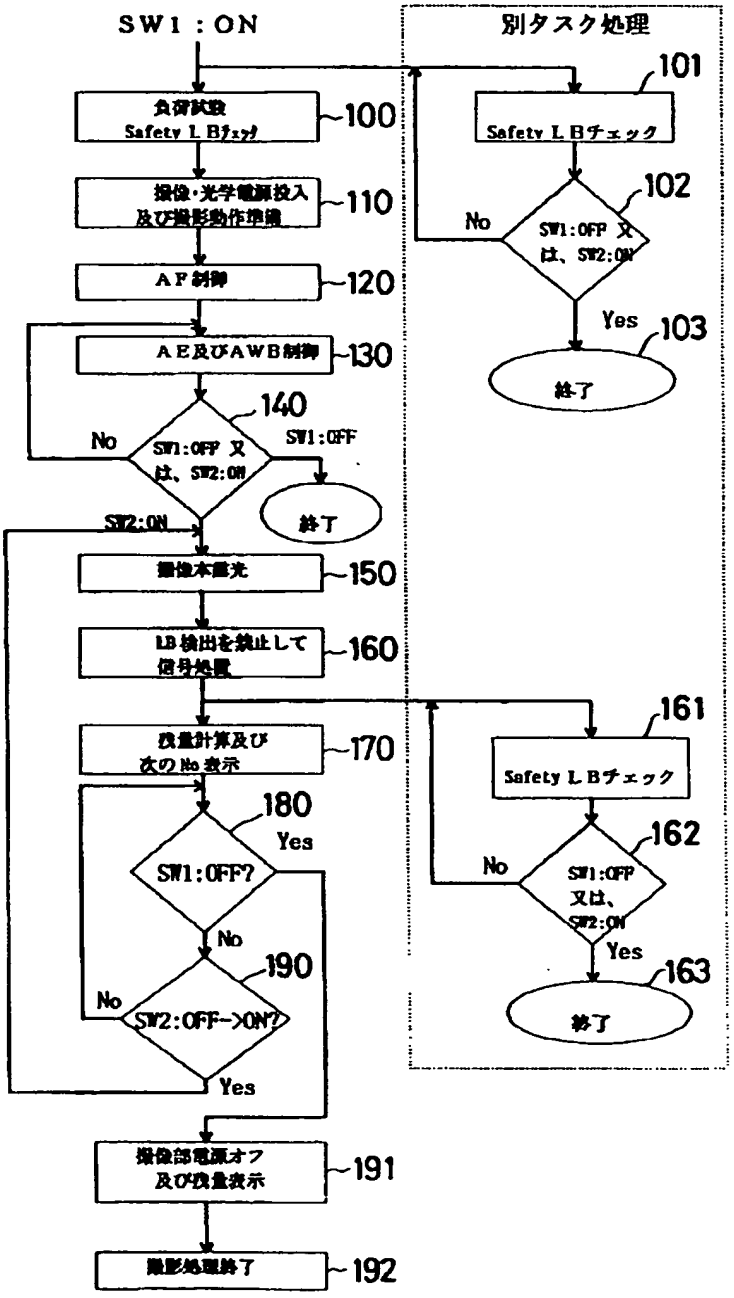
【図6】

従来のデジタルカメラシステム



【図3】

撮影シーケンスメインフロー



【図5】

撮影本露光の内部フロー